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(54) LIGHTWEIGHT COATED PAPER FOR OFFSET PRINTING

(57)Abstract:

PROBLEM TO BE SOLVED: To provide lightweight coated paper for offset printing, having excellent quality due to being furnished with a well-balanced combination of blank paper glossiness, opacity, printed surface strength and print glossiness, and capable of being applied with a coating liquid at high speed in a good processability.

SOLUTION: When this lightweight coated paper for offset printing has two coated layers both containing a pigment and an adhesive, the top coat layer comprises 50-85 pts.wt. calcium carbonate having an average particle diameter not smaller than 0.2 μm and smaller than 0.5 μm as the pigment and 8-15 pts.wt. copolymer latex having 50-70 nm average particle diameter and 50-70% gel content as the adhesive both based on 100 pts.wt. pigment.

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CLAIMS

[Claim(s)]

[Claim 1] The coated paper for lightweight offset printing characterized by a mean particle diameter carrying out 8-15 weight section inclusion of the copolymer latex whose gel content a mean particle diameter is 50-70nm, and is 50 - 70% considering or more 0.20 calcium carbonate it is [calcium carbonate] less than 0.50 micrometers as 50 in the pigment 100 weight section - 85 weight section, and adhesives to the pigment 100 weight section as a pigment at a finishing coating layer in the coated paper for offset printing which prepared two layers of the coating layers which have a pigment and adhesives.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the double coated paper for lightweight offset printing which uses the diameter copolymer latex of a granule as the calcium carbonate atomized as a pigment, and adhesives.

[0002]

[Description of the Prior Art] The need in an aiming at advertisements [, such as a catalog for mail orders, a throwaway, a catalog, a pamphlet, and direct mail,] and advertisement commercial-in print sheet printing field is extended in recent years. Although the goods value of itself of these commercial printed matter is low, since it is important that the purpose is attained as an advertisement medium, it is asked for the good thing of a printing result by the low cost. Especially, visualization of printed matter progresses, the demand to a print sheet is also diversified, further, a printing method is also crossed to varieties, such as gravure, rotary offset, and sheet offset, and the development of a print sheet with the property which suited each printing method is progressing.

[0003] On the other hand, after going into a low-growth time age in recent years, in connection with lightweight-izing and low-cost-izing of a print sheet, grade down of low ***** is advancing quickly in the coat paper of A grade. It is obtaining the product which whose opacity's is [the demand to the lightweight print sheet which performs a pigment coating] high, is excellent in a printing surface intensity, and is excellent in a blank paper and printing gloss in such status under a high productivity.

[0004] Since cheap pigments, such as a calcium carbonate, are used for an under coat coating layer, multilayer coated papers, such as a double coating which prepared the finishing coating layer, can manufacture cheaply, the covering nature of stencil paper improves by the under coat coating also in quality and the shape of a field and a printing quality also become good recently rather than the monolayer coated paper which carried out the single coating of the coating liquid to stencil paper, it is in the present condition whose product by the multilayer coating has increased in the few coated paper for lightweight printing of the amount of

[0005] However, in the case of a double coated paper, a decrement of the amount of coatings causes aggravation of a printability, and a fall of a printing opacity. If especially the amount of top coatings decreases, it will appear more notably. for this reason, the technique of blending a atomization pigment, a plastics pigment, etc. for fall prevention of printing gloss -- moreover, although the technique of blending a pigment of a high refractive index like a titanium dioxide for fall prevention of a blank paper and a printing opacity is proposed Since it may not necessarily be satisfied since each technique for the problem solving mentioned above has important practical fault and limitation while effective property enhancement is aimed at, and it is necessary to make [many] the amount of combination and for obtaining sufficient quality, the actual condition does not escape becoming cost quantity.

[0006] For example, although what was excellent as blank paper gloss and opacity will be obtained if the atomized calcium carbonate is blended, there is a difficulty that printing gloss and a printing surface intensity fall remarkably, and since in the case of the coating liquid using the atomization pigment the

viscosity (high ***** viscosity) in fluid aggravation of coating liquid, especially a high shear rate rises and ***** tightness etc. occurs, high-speed operation nature falls further.

[0007] Therefore, in the manufacture of the double coated paper for lightweight printing which used the atomized calcium carbonate, the high ***** viscosity of coating liquid was low excellent in high-speed operation nature, and it was difficult to reconcile the conditions which give blank paper gloss, outstanding opacity and printing gloss, and the outstanding printing surface intensity.

[0008]

[Problem(s) to be Solved by the Invention] In view of the above status, especially the technical problem of this invention is two or less [70g //m] basis weight in the coated paper for lightweight offset printing, and offers the coated paper for lightweight offset printing which was equipped with blank paper glossiness and opacity, a printing surface intensity, and printing glossiness with the sufficient balance, was excellent in quality, and was further excellent in the high-speed operation nature of coating liquid.

[0009]

[Means for Solving the Problem] In the coated paper for offset printing which prepared two layers of the coating layers which have a pigment and adhesives as a result of this invention persons' examining this technical problem zealously In a finishing coating layer, a mean particle diameter as a pigment or more 0.20 calcium carbonate it is [calcium carbonate] less than 0.50 micrometers in the pigment 100 weight section 50 - 85 weight section, And by carrying out 8-15 weight section inclusion of the copolymer latex whose gel content a mean particle diameter is 50-70nm, and is 50 - 70% to the pigment 100 weight section as adhesives It excelled in the high-speed operation nature of coating liquid, and found out that the lightweight offset-printing form equipped with blank paper glossiness, opacity, a printing surface intensity, and printing glossiness with the sufficient balance as a coated-paper quality was obtained.

[0010] The diameter latex of a granule falls remarkably the fluid enhancement in coating liquid, and the viscosity (high ***** viscosity) in a high shear rate especially, and the printing surface intensity of the above-mentioned effect improves by the pasting up point with a pigment increasing. Moreover, in order that a coating layer structure may make it precise according to an interaction as ground whose printing gloss manifestation nature improved by using the precipitated calcium carbonate of a particle, and the latex of the diameter of a granule, an ink drying property becomes late and it is thought that printing gloss manifestation nature improved.

[0011] However, if the precipitated calcium carbonate of a particle and the latex of the diameter of a granule are blended so much, in order that a coating layer structure may make it precise to a degree very much, the minus side that blank paper glossiness and ink impression nature fall will be generated. Moreover, since it is obliged to a lot of emulsifier addition than usual for obtaining a stable aquosity emulsion since specific surface area will increase remarkably if a latex is diameter[of a granule]-ized very much to a degree and it also has the fault that as a result a fall of a wet intensity is not avoided, it is important to combine the modality and the amount of combination of a pigment and adhesives with a sufficient balance.

[0012] In this invention, the particle diameter of a calcium carbonate needs to or more 0.20 be less than 0.50 micrometers, and is 0.30-0.45 micrometers preferably. To a parvus case, the high ***** viscosity of coating liquid rises rather than 0.20 micrometers, the particle diameter of a calcium carbonate is inferior to high-speed operation nature, and opacity, printing glossiness, and a printing surface intensity fall. Moreover, in 0.50 micrometers or more, a printing surface intensity improves, and sufficient blank paper glossiness, opacity, and printing glossiness are not obtained. Moreover, although a blank paper, printing glossiness, and opacity improve when the amount of combination of the atomized calcium carbonate is less than 50 % of the weight, it is inferior to the high-speed operation nature of coating liquid, and a printing surface intensity falls. Moreover, if 85 % of the weight is exceeded, although the high-speed operation nature of coating liquid and a printing surface intensity are good-ized, blank paper gloss manifestation nature and printing glossiness will get worse, and opacity will also fall.

[0013] The particle diameter of the diameter latex of a granule needs to be in the domain of 50-70nm, and although a dry intensity improves when a particle diameter is less than 50nm, while a wet intensity

falls and the blank paper glossiness of a coated paper falls remarkably, a fall of opacity also accompanies in this case. Moreover, if the particle diameter of a latex exceeds 70nm, it will be inferior to high-speed operation nature, and the opacity, the printing surface intensity, and printing glossiness which can be satisfied will not be obtained. Moreover, it is necessary to use 50 - 70% of a thing about a gel content, and is 50 - 60% preferably. In the case of less than 50% of gel contents, a printing surface intensity, a blank paper, and printing glossiness fall, and although a dry intensity improves in exceeding 70%, a wet intensity falls.

[0014] Although it is necessary to carry out the amount of combination of the diameter latex of a granule to 8 - 15% of the weight, and blank paper glossiness and opacity improve when the amount of combination is less than 8 % of the weight, it is inferior to high-speed operation nature, and a printing surface intensity and printing glossiness fall. On the other hand, although a printing surface intensity and printing glossiness improve in exceeding 15 % of the weight, blank paper glossiness and opacity fall.

[0015]

[Embodiments of the Invention] After the calcium carbonate used as a pigment in the coating layer of this invention carries out the slaking of the calcined lime with water or weak liquid at the caustification process of the pulp manufacturing process by the whiting, the precipitated calcium carbonate obtained by blowing carbon dioxide gas into a calcium hydroxide, the sulphate process, or the soda method, it mixes the precipitated calcium carbonate manufactured by carrying out a caustification reaction by **** at a respectively independent or arbitrary rate, and is used. Moreover, the atomization calcium carbonate used by this invention is prepared by agitating by impellers, such as a disk, a bar, and a screw, in the container filled up with hard-glass minute grain etc. in the calcium-carbonate slurry which carried out optimum-dose addition of the polycarboxylic-acid system dispersant.

[0016] Moreover, in addition to a calcium carbonate, one or more sorts are used together for the whiting generally used, a kaolin, clay, baking clay, talc, a satin white, a silica, a plastics pigment, a titanium dioxide, etc. as a pigment.

[0017] A styrene butadiene copolymer, a styrene butadiene acrylic copolymer, or its denaturation object is used, and the adhesives in the coating layer of this invention have the desirable things for which vinyl system unsaturated carboxylic acids, such as a vinyl compound or an acrylic acid, and a fumaric acid, are used in addition to this, such as a vinyl system unsaturated-carboxylic-acid ester compound besides methyl methacrylate besides styrene and a butadiene, and an acrylonitrile, as a monomer of these polymers.

[0018] Moreover, as starch used together, an oxidized starch, phosphate-ized starch, etherification starch, hydroxy ethylation starch, enzyme denaturation starch, cold-water fusibility starch, etc. are used.

[0019] You may use the various assistants blended with the usual pigments for application papers, such as a dispersant, a thickener, a water retention agent, a defoaming agent, and a deck-watertight-luminaire-ized agent, for the coating layer of this invention.

[0020] As stencil paper used by this invention, a mechanical pulp, a chemical pulp, used paper recovery pulp, etc. are mixed by arbitrary proportion, it is used, and the paper manufacture raw material which added the loading material for paper manufacture, a paper durability reinforcement agent, a usual yield improver, a usual sizing compound, etc. if needed is milled with the usual paper machine which has a single wire or a twin wire.

[0021] In addition, in the case of this invention, as stencil paper, an effect is looked at by especially the lightweight thing and, in 40g/m², the effect of this invention is preferably demonstrated especially notably two or less [45g //m] as a concrete basis weight.

[0022] Especially the technique of carrying out the coating of the coating liquid of the under coat by this invention to stencil paper is not limited, and can use various coating equipments, such as various blade coating machines, a roll coater, an air knife coater, a bar coating machine, a rod blade coating machine, and a short dwell coating machine, by the on-machine or the off machine.

[0023] Moreover, although especially the technique of carrying out the coating of the coating liquid of the finishing layer by this invention is not limited, either, it is desirable that a blade coating is carried out by the on-machine or the off machine. As a blade coating machine, a bevel type or a vent type blade

coating machine, a building blade, a rod blade, a short dwell coating machine, a twin blade, etc. are used. In this invention, you may prepare the above under coat coating layer in the bottom of the specified finishing coating layer much more. the amount of coatings of this invention -- the total amount of coatings -- both sides -- 10-24g/m² -- an effect is preferably demonstrated more by 10-20g/m² The smoothness of an under coat becomes high too much, and it becomes impossible to stop occurrence of a streak or a scratch, if it is desirable that it is 5-10g/m² as for the amount of coatings of an under coat and it exceeds 10g/m². The shape of stencil paper covering nature and a field tends to become bad the case of less than [5g //m] two. Moreover, as for the amount of coatings of a finishing layer, an effect appears more by both sides 5-17g/m².

[0024] Although the coated paper which carries out the coating of the coating liquid of this invention, and is obtained is produced commercially as a coated paper for printing using surface-finish equipments, such as a supercalender, a gross calender, and a soft calender, it can perform light finishing processing or can obtain the coated paper for printing of the low matte tone of gloss by-less processing. Moreover, either a sheet or rolling up of the coated paper for printing of this invention is possible for offset printing.

[0025] In addition, a basis weight is [two or less / 70g //m] / desirable, and, as for the coated paper for lightweight offset printing of this invention, an effect appears more or less / 65g //m] by two.

[0026]

[Example] Although an example is given to below and this invention is more concretely explained to it, of course, it is not limited to the domain. In addition, the section in an example and especially % show weight section and weight %, respectively, unless it refuses.

It measured with the mean-particle-diameter:CP [Shimazu centrifugal-settling formula particle-size-distribution measuring device SA-]2 type (Shimadzu make) of the <quality evaluation technique (1)> pigment.

(2) The mean-particle-diameter:latex of a latex was processed by the osmic acid and it asked for the path of 1000 grain in the microphotography which expands this by 30,000 times with an electron microscope, and was obtained by the number average.

(3) Blank paper glossiness:JIS According to P-8142, it measured at 75 angles.

(4) Use an opacity:brightness-by-Hunter meter and it is JIS. It measured according to P-8138 and the A method.

(5) a printing glossiness:RI-I type printing machine (dawn factory) -- using -- the product (TK highness plus red ink) made from Oriental ink -- using it -- amount of ink 0. -- it was fixed 18 or 0.25ml, and printed The glossiness of each printed matter was measured by the glossmeter (Murakami color technical research center GM-26D), ink concentration was measured with the Macbeth reflection density meter (RD918), the glossiness in ink concentration 1.5 was computed, and it considered as the glossiness after printing.

(6) Using the wet on-the-strength:RI-I type printing machine (dawn factory), it wetted in the sample, water was given, and TK highness plus red ink made from Oriental ink was used 5 seconds after, and it was fixed the amount of 0.3ml of ink, and printed, and relative evaluation was visually made on the picking grade of a printing side.

[0027] O = -- O= which is not generated at all -- the hardly generated (7) dry on-the-strength:RI-I type printing machine (made in a dawn factory) with remarkable x= occurrence of which **= occurrence is done -- using -- the product made from Oriental ink -- TV-24 were used, and it was fixed the amount of 0.35 cc of ink, and printed, and relative evaluation was visually made on the picking grade of a printing side

[0028] O = -- O= which is not generated at all -- the time of the (8) ***** tight evaluation:coating with hardly generated remarkable x= occurrence of which **= occurrence is done -- ***** -- the tight occurrence status was observed visually

[0029] O As opposed to the [example 1] whitening 20 section with hardly generated remarkable x= occurrence of which **= occurrence is done, the precipitated-calcium-carbonate 76 section, and the 2nd class kaolin 4 section = -- O= which is not generated at all -- The 0.3 sections of sodium-polyacrylate

system dispersants were added, and it distributed in water using the cow loess disperser, and as adhesives, the 3.5 sections and the 26 sections of phosphate-ized starches were blended for the styrene butadiene system copolymer latex, and under coat coating liquid of 40% of solid-content concentration was adjusted.

[0030] Next, to the 0.40 micrometer atomization calcium-carbonate 62 section and the kaolin 38 section, the 0.3 sections of sodium-polyacrylate system dispersants were added, it distributed in water using the cow loess disperser, the 13.0 sections and the 3.8 sections of phosphate-ized starches were blended for the styrene butadiene system copolymer latex (1) whose gel content a mean particle diameter is 55nm and is 55% as adhesives to the pigment 100 section, and finishing coating liquid of 65% of solid-content concentration was prepared.

[0031] The amount of coatings carried out 5g/[m] 2 coating per solid content of the under coat coating liquid to 45g of basis weights/, and the stencil paper of m2 by both sides using the gate roll coater whose coating speed is a part for 800m/, and the under coat coated paper was obtained.

[0032] Furthermore, the amount of coatings carried out 16g/[m] 2 coating per solid content of the finishing coating liquid to the under coat coated paper by both sides using the blade coating machine whose coating speed is a part for 1300m/. Subsequently, supercalender processing (number-of-stages:11 step, linear pressure of 200kg/cm) was performed, and the coated paper for offset printing was obtained. Except that 40g/m2, and the amount of under coat coatings set the basis weight of stencil paper to 9g/m2 by both sides in the [example 2] example 1, the coated paper for printing was obtained by the completely same technique as an example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except setting the particle diameter of a pigment to 0.25 micrometers in the [example 3] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except making the amount of combination of a calcium carbonate into the 80 sections in the [example 4] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except setting the particle diameter of a latex to 68nm in the [example 5] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except making the gel content of a latex into 67% in the [example 6] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except making the amount of combination of a latex into 9% in the [example 7] example 1.

The coated paper for offset printing was obtained by the completely same technique as an example 1 except setting the particle diameter of a calcium carbonate to 0.15 micrometers in the [example 1 of comparison] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except setting the particle diameter of a calcium carbonate to 0.60 micrometers in the [example 2 of comparison] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except making the amount of combination of a calcium carbonate into the 40 sections in the [example 3 of comparison] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except making the amount of combination of a calcium carbonate into the 95 sections in the [example 4 of comparison] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except setting the particle diameter of a latex to 40nm in the [example 5 of comparison] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except setting the particle diameter of a latex to 100nm in the [example 6 of comparison] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except making the gel content of a latex into 35% in the [example 7 of comparison] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except making the gel content of a latex into 85% in the [example 8 of comparison] example 1.

The coated paper for printing was obtained by the completely same technique as an example 1 except making the amount of combination of a latex into 6.5% in the [example 9 of comparison] example 1. The coated paper for printing was obtained by the completely same technique as an example 1 except making the amount of combination of a latex into 20% in the [example 10 of comparison] example 1. The above evaluation result was shown in Table 1.

[0033]

[Table 1]

表 1

	白紙光沢 度 (%)	不透明度 (%)	印刷光沢 度 (%)	ウェット 強度	ドライ 強度	スタラク タイト
実施例 1	58.2	86.5	77.5	◎	◎	◎
実施例 2	60.3	87.6	78.7	◎	◎	◎
実施例 3	62.8	88.1	77.6	◎	○	○
実施例 4	57.4	85.6	78.8	○	◎	◎
実施例 5	58.9	86.8	77.1	○	○	○
実施例 6	57.5	85.8	77.8	○	◎	◎
実施例 7	59.4	86.9	76.7	○	○	○
比較例 1	63.0	84.2	73.2	×	×	×
比較例 2	55.2	84.9	75.0	◎	◎	◎
比較例 3	65.3	87.8	78.9	×	×	×
比較例 4	55.9	85.2	75.3	○	○	◎
比較例 5	54.8	84.5	78.8	△	◎	◎
比較例 6	56.8	85.2	75.1	△	△	△
比較例 7	56.6	85.6	75.6	×	×	◎
比較例 8	57.2	85.5	77.0	×	◎	○
比較例 9	58.8	86.8	75.0	×	×	△
比較例 10	55.1	83.9	78.6	◎	◎	◎

Examples 1-7 are equipped with blank paper glossiness and opacity, a printing surface intensity, and printing glossiness with a sufficient balance, are excellent in quality, and are further excellent in the high-speed operation nature of coating liquid so that clearly from Table 1. The example 1 of a comparison is inferior to opacity, printing glossiness, a wet intensity, a dry intensity, and high-speed operation nature. The example 2 of a comparison is inferior to blank paper glossiness and printing glossiness. The example 3 of a comparison is inferior to a wet intensity and a dry intensity. The example 4 of a comparison is inferior to blank paper glossiness and printing glossiness. The example 5 of a comparison is inferior to blank paper glossiness, opacity, and a wet intensity. The example 6 of a comparison is inferior to printing glossiness, a wet intensity, a dry intensity, and high-speed operation nature. The example 7 of a comparison is inferior to a wet intensity and a dry intensity. The example 8 of a comparison is inferior to a wet intensity. The example 9 of a comparison is inferior to printing glossiness, a wet intensity, a dry intensity, and high-speed operation nature. The example 10 of a comparison is inferior to blank paper glossiness and opacity.

[0034]

[Effect of the Invention] By this invention, blank paper glossiness, opacity, and printing glossiness are high, a printing surface intensity is strong, and the qualitative balance is good and can obtain the coated paper for lightweight offset printing which was further excellent in the high-speed operation nature of coating liquid.

[Translation done.]